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Solution by G. B. M. ZERR, A. M., Ph.D., Philadelphia, Pa.; A. H. HOLMES, Brunswick, Me.; and J. SCHEFFER, A. M., Hagerstown, Md.

Let $[x, \sqrt{(a^2-x^2)}]$ be the coordinates of the point referred to the mid-point of $2a$ as origin. Then $\sqrt{[2a(a-x)]}$ and $\sqrt{[2a(a+x)]}$ are the distances of the centers of the spheres from this point, where $\sqrt{[2a(a-x)]}$ is the distance to the center of sphere radius $r_1<r_2$.

$$\therefore 2\pi r_1^2\left(1-\frac{r_1}{\sqrt{[2a(a-x)]}}\right) \text{ and } 2\pi r_2^2\left(1-\frac{r_2}{\sqrt{[2a(a+x)]}}\right)$$

are the portions of the respective spherical surfaces visible from the point.

$$\therefore 2\pi\left(r_1^2-\frac{r_1^3}{\sqrt{[2a(a-x)]}}+r_2^2-\frac{r_2^3}{\sqrt{[2a(a+x)]}}\right)=\text{a maximum.}$$

$$\therefore \frac{r_2^3}{\sqrt{(a+x)}}=r_1^3/\sqrt{(a-x)}.\quad \therefore x=\frac{a(r_2^6-r_1^6)}{r_2^6+r_1^6},\ \sqrt{(a^2-x^2)}=\frac{2ar_1^3r_2^3}{r_1^6+r_2^6}.$$

$$\text{Visible surface}=2\pi\left(r_1^2+r_2^2-\frac{\sqrt{(r_2^6+r_1^6)}}{a}\right).$$

Also solved by J. E. Sanders, C. N. Schmall, and H. V. Spunar.

CALCULUS.

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256. Proposed by PROFESSOR R. D. CARMICHAEL, Anniston, Ala.

Solve the differential equation, $(1+y+2axy)dx+x(1+x)dy=0$.

Solution by G. B. M. ZERR, A. M., Ph. D., Philadelphia, Pa.

$$\frac{dy}{dx}+\frac{y(1+2ax)}{x(1+x)}+\frac{1}{x(1+x)}=0.$$

$$\therefore y e^{\int P dx}=C+\int Q e^{\int P dx}dx.$$

$$\int P dx=\int\frac{1+2ax}{x(1+x)}dx=\log[x(1+x)^{2a-1}.\quad Q=-\frac{1}{x(1+x)}.$$

$$\therefore xy(1+x)^{2a-1}=C-\int(1+x)^{2a-2}dx.$$

$$\therefore\left(xy+\frac{1}{2a-1}\right)(1+x)^{2a-1}=C.$$

Also solved by G. W. Hartwell, J. Scheffer, H. V. Spunar, Francis Rust, and T. I. Wodo.